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THE SKIN SURFACE AND FRICTION.

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FRICTION is one of the commonest insults to which human skin is exposed.

The author's interest in the effects of friction on skin was aroused during the course of experimental work on load-carrying at the Army Operational Research Group in 1950 (Lippold and Naylor, 1951). The importance of the damaging effects of friction between the skin and straps and clothing was soon realized, but very little original work on the subject could be traced. Although a great deal is now known about frictional properties of different materials this knowledge has not been applied to problems in connection with skin.

The classical concepts of friction are as follows :

When two surfaces are in contact their relative movement is resisted by friction. If a gradually increasing force is applied to such a system in an attempt to produce relative movement between the surfaces, the frictional force increases correspondingly and always acts in such a direction as to maintain the state of rest or to oppose the movement. When the applied force is sufficiently large it exceeds the frictional force and movement occurs. The frictional force, when movement is occurring at a constant velocity, is directly proportional to the normal reaction, or load, but is independent of the area of the surfaces which are in contact and of the velocity of movement. The ratio of the frictional force to the load is a constant known as the coefficient of dynamic friction ; its value depends on the nature of the surfaces which are in contact.

The frictional force immediately before movement occurs is called the limiting frictional force ; its value is frequently greater than the frictional force when movement is occurring at a constant velocity. The limiting frictional force is directly proportional to the load, but is independent of the

area of the surfaces which are in contact. The ratio of the limiting frictional force to the load is also a constant, known as the coefficient of static friction.

These facts have been known for a long time and Leonardo da Vinci (1452-1519) writes: "Friction produces double the amount of effort if the weight be doubled" and "The friction made by the same weight will be of equal resistance at the beginning of movement although the contact may be of different breadths or lengths".

Lubrication of surfaces reduces the amount of friction between them. If the surfaces are separated by a lubricant film of molecular dimensions, referred to as boundary lubrication, the friction is influenced by the nature of the underlying surfaces as well as by the lubricant. If the surfaces are separated by a thick film of lubricant, referred to as hydrodynamic or fluid lubrication, the frictional properties will depend entirely upon the physical properties of the interposed layer of lubricant. Fluid lubrication is more effective in reducing friction than boundary lubrication.

PART I.

The Apparatus.

In order to investigate surface frictional phenomena a machine has been designed and built to rub skin at a constant speed and constant vertical load and to record continuously the frictional force between skin and the rubbing agent. Details of the machine have been published elsewhere (Naylor, 1953) but are included here for completeness.

The Machine.

An arm (1) (Figs. 1 and 2) is supported in a horizontal position for sliding in the direction of its length. One end of the arm supports a vertical cylindrical sleeve (1a), in which screws a threaded rod (2). The rod may be secured in any desired position by means of two locking nuts (4), and a fixing screw (3), in the wall of the sleeve. To the lower end of the rod is secured the top end of a vertical flat leaf spring (5), the plane of which is maintained at right angles to the direction of the arm by means of a vertical groove (2a) in the rod, engaged by the end of the fixing screw (3). To the lower end of the leaf spring is secured a support (6) for the friction head (7), which has a smooth hemispherical lower end and rests on the skin surface. There are two interchangeable friction heads each of 8 mm. diameter; one is made of polythene and the other of silver.

The opposite end of the arm from that to which the sleeve is secured carries a ball-race (8) which engages with the circumference of a rotatable cam (9). The arm (1) is moved on the support (11), for horizontal reciprocation by means of the cam. The cam is shaped to give constant velocity movement of the arm in both directions with a sharp changeover at the ends of the movement. The arm is kept in contact with the cam by springs (10), one on each side of the arm (1). Each spring is secured at one end to the rod and at the other end to the support (11), which guides and supports the arm (1) in its sliding movement. The cam imparts an excursion of 2.5 cm. to the arm (1), and to the friction head.

The arm is hinged at an intermediate point (12), and the loading force on the friction head can be adjusted by means of a weight (13) mounted for sliding along the arm. A spirit level (14) is also mounted on the right-hand side of the arm.

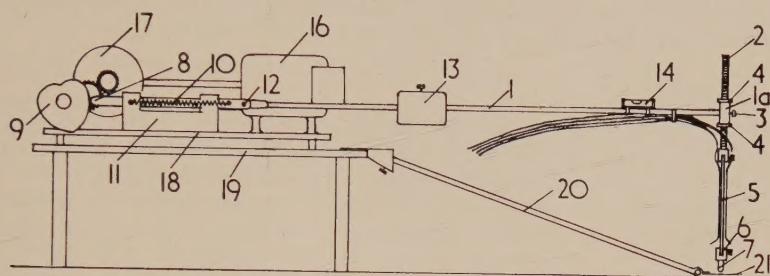


FIG. 1.—Side elevation of friction machine (line drawing).

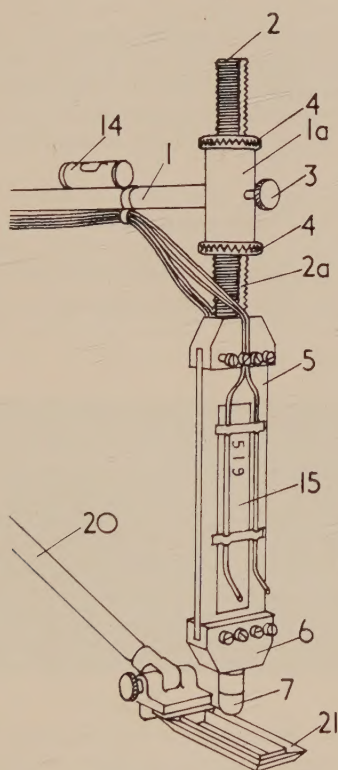


FIG. 2.—Friction machine showing details of strain gauges and friction head (line drawing).

The cam (9) is arranged to be driven from an electric motor (16) by means of a friction coupling to a wheel (17). The position of the electric motor is variable by a screw mechanism, and the cam may be driven at any desired speed. A trip counter records the number of revolutions of the cam.

The support (11) and cam (9) are carried on a platform (18), which is adjustably mounted on a platform (19) which also carries the motor (16). The platform (19) is adjustable for height and carries a hinge to which may be clamped one end of an

arm (20). The opposite end of the arm (20) supports a rectangular frame (21). The frame (21) is fastened to the skin with collodion and provides lateral support to the skin over which the friction head (7) is to move. The arm (20) is adjustable in relation to the platform (19) to correspond to any horizontal adjustment of the platform (18). This ensures that the arm (20) lies vertically below the arm (1).

The Recording System.

The frictional force on the head, producing deformation of the flat leaf spring (5), is measured by a pair of resistance strain gauges (15) which are mounted one on each side of the leaf spring. The strain gauges are connected as two of the arms of a Wheatstone bridge circuit across a Cambridge string galvanometer. Deformation of the leaf spring causes reciprocal alteration of the strain gauge resistance, thereby ensuring a maximum potential drop across the galvanometer. The galvanometer deflections are recorded photographically.

Calibration.

The right-hand side of the arm (1) is turned about the hinge (12) and raised to a vertical position. Weights are hung from the friction head (7) and the deflection of the galvanometer string recorded. With the string adjusted to give 1 cm. deflection per mV the deflection of the string is approximately 1 mm. per 10 gm. A graph shows an almost linear relationship between the string deflection and the weight over a range of 300 gm.

The natural frequency of the spring and friction head is 60c/s.

The frequency response of the strain-gauges and the recording system is such that the tracings indicate irregularities of the surface which are large enough to produce a change in the frictional force between the friction head and the surface over which it is sliding. Each area gives a characteristic tracing and all tracings from the same area may be accurately superimposed. This is shown in Fig. 3 which is a recording taken from a surface of morocco leather.

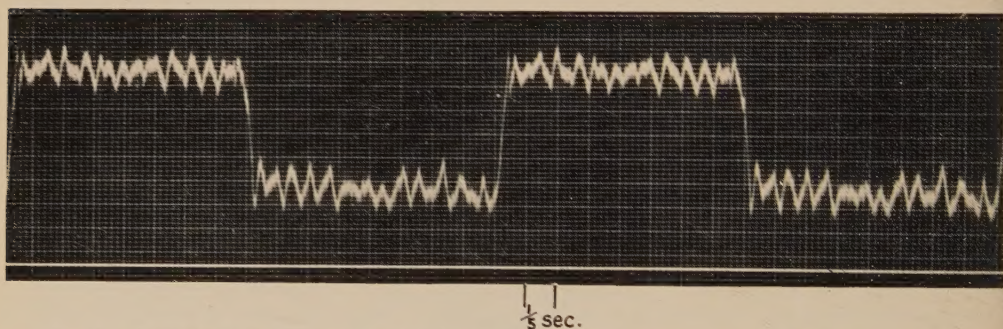


FIG. 3.—Recording of the pattern of frictional force between morocco leather and polythene. The two upper irregular lines are recordings of deflections of the string galvanometer; these are proportional to the frictional force which occurred between morocco leather and polythene during movement of the friction head in one direction. The two lower irregular lines represent deflections of the string galvanometer which are proportional to the frictional force which occurred during movement of the friction head in the opposite direction. As the leather was rubbed symmetrically, the frictional force was equal, but opposite, during both directions of movement. The distance between the upper and lower lines is therefore proportional to twice the frictional force which occurred between morocco leather and polythene during movement of the friction head in either direction. The lines connecting the upper and lower deflections represent reversal of the direction of the frictional force, a result of reversal of the direction of movement of the friction head. During a reversal of the direction of movement, the friction head is stationary but reversal of the direction of distortion of the leaf-spring (5) is occurring.

As will be described in Part II, all the experiments have been carried out on skin overlying the anterior surface of the tibia and tracings from the same area in this site are equally characteristic, as can be seen from Figs. 6, 7, 8 and 9. The minute skin-surface irregularities are too small in comparison with the size of the friction head to produce appreciable changes in the frictional force between them and it appears probable that the characteristic variations in the frictional force are due mainly to larger irregularities in the underlying anterior surface of the tibia and partly to localized variations in the frictional properties of the skin surface. "Stick-slip" or intermittent motion may also be an explanation for some of the fluctuations in the recorded frictional force, but this was never sufficiently marked to be visible or audible during an experiment.

Recordings of the frictional force between skin and polythene or silver have never shown any consistent difference between the limiting frictional force and the frictional force when movement was occurring at a constant velocity. The unqualified term "coefficient of friction" will therefore be used and "static" or "dynamic" omitted.

PART II.

The Effect of Environmental Factors upon the Coefficient of Friction between Skin and Polythene.

Experiment 1

The material employed for rubbing the skin surface in all experiments has been either polythene or silver. The reason for this choice is that neither of them is irritant to biological material. Any changes produced in skin by rubbing it with either of these two materials may therefore be ascribed to mechanical and not to chemical irritation.

The relationship between vertical load and frictional force for skin and polythene has been measured using the apparatus described.

Method.

In all experiments the area of skin used is that over the middle third of the anterior surface of the tibia. This area was chosen because it is easily accessible, the skin is flat and is firmly supported by bone, subject-to-subject variation in subcutaneous tissue is small, and the stratum corneum is thin. This last factor is important for reasons which will be discussed in a subsequent paper.

For such an experiment the skin is prepared by snipping away the long hairs with scissors and the supporting frame is stuck to the skin with collodion. There is no other preparation of the skin surface. The subject's leg rests comfortably on the bench and is so supported by sandbags that the skin

inside the frame is horizontal. The arm of the machine is then adjusted so that when the friction head rests on the skin inside the frame the spirit level on the arm of the machine shows the arm to be horizontal. Before each recording the right-hand side of the arm [(1) Fig. 1], is turned about the hinge (12), and raised to a vertical position. A weight of 200 gm. is then suspended from the friction head to provide a true mechanical calibration. The arm (1) is then swung into a horizontal position with the friction head resting freely on the skin surface inside the supporting frame. The electric motor is switched on and the friction head moves over the skin surface. The speed of rubbing is one cycle in 3 seconds. Three cycles are completed for each perpendicular load and the frictional force recorded in each case. The tracings show an irregular pattern of frictional force for reasons which were discussed in Part I. An approximate average value for the frictional force in each case is made by visual inspection.

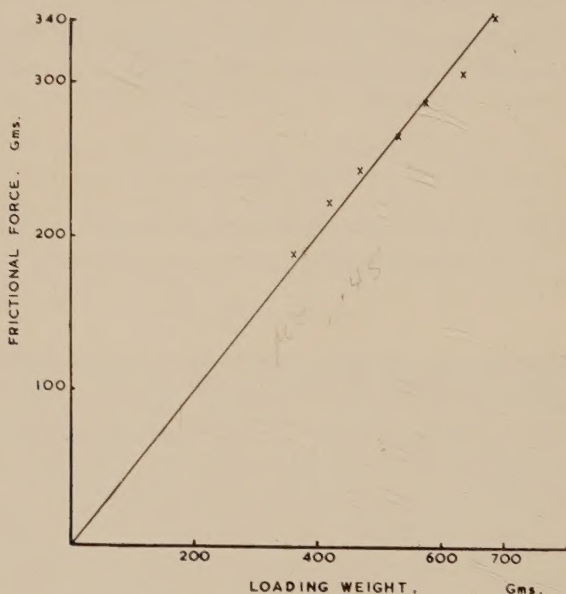


FIG. 4.—The variation of the frictional force with the vertical load between skin and polythene.

Results.

The results of a typical experiment are shown in the form of a graph in Fig. 4. At the time of this experiment the frictional force was proportional to the load. The coefficient of friction between skin and polythene calculated from the graph was 0.5.

Experiment 2.

The coefficient of friction between two surfaces will remain constant only when the physical conditions of the surfaces remain constant. The surface

conditions of skin can be made to vary by changing the environmental conditions of the subject.

Method.

The subject was made to sweat by covering him with blankets and hot-water bottles and surrounding him with electric fires. Air at room temperature was then blown on to the area of skin being rubbed. Later, the fires were turned off, the blankets and hot-water bottles removed and the laboratory door was opened. This was followed by the removal of grease from the skin surface by rubbing it with an ether swab. During these procedures, the frictional force at a constant loading weight of 650 gm. was recorded at intervals following the same procedure described in the previous experiment, except that only one rub was completed for each recording. The coefficient of friction between skin and polythene was then calculated for each occasion from the results.

Results.

The results of this experiment are shown in the form of a graph in Fig. 5. When the subject sweated there was a sharp rise in the coefficient of friction

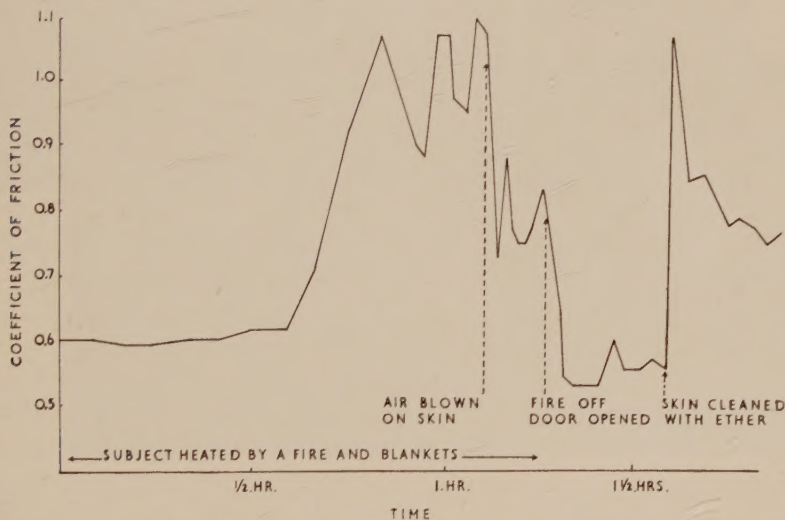


FIG. 5.—The variation of the coefficient of friction between skin and polythene with changes in environmental conditions. Vertical load constant at 650 gm.

between skin and polythene. Air blown on the skin surface caused a fall in this previously high value, and removal of the blankets and fires caused a fall to a value below that of the original resting level. Removal of the grease again caused a sharp rise in the coefficient of friction between the two surfaces and this was followed by a gradual fall towards the original resting level.

*Experiment 3.**Method.*

These changes in the coefficient of friction between skin and polythene caused by sweat and grease have been studied by adding arachis oil or water to the skin surface while it was being rubbed. The frictional force between the surfaces was recorded during each experiment.

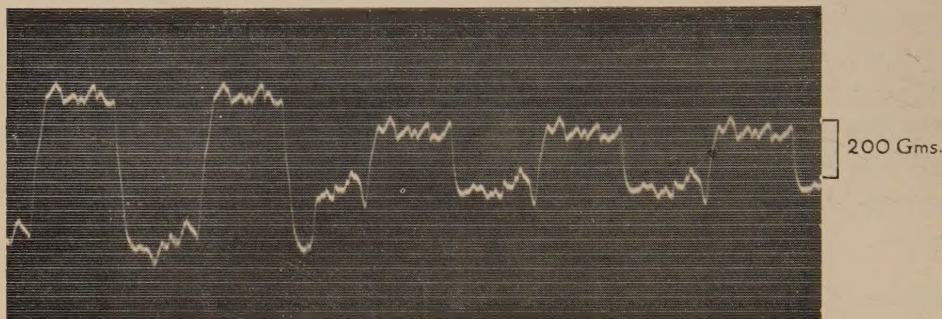


FIG. 6.—The effect of arachis oil on the frictional force between skin and polythene. Rubbing speed 1 cycle in 3 seconds. Vertical load 530 gm.

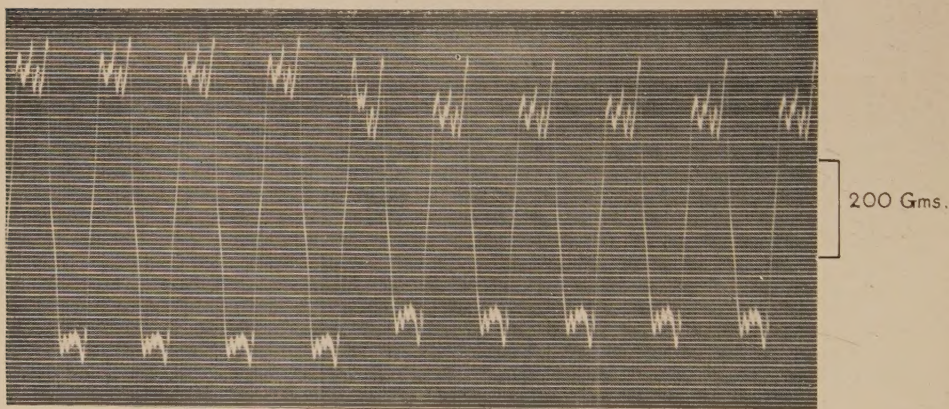


FIG. 7.—The effect of talc on the frictional force between skin and polythene. Rubbing speed 1 cycle in 3 seconds. Vertical load 530 gm.

Results.

The effect of arachis oil upon the frictional force between skin and polythene is shown in Fig. 6. Its lubricating effect is sudden and constant.

The effect of a puff of powdered talc is shown in Fig. 7. The result is similar but less well marked.

A drop of water placed on the skin surface acts as a lubricant. This is shown

in Fig. 8. A trace of water applied to the skin surface with a camel-hair brush has the reverse effect. This is shown in Fig. 9. The frictional force increases progressively with the number of rubs.

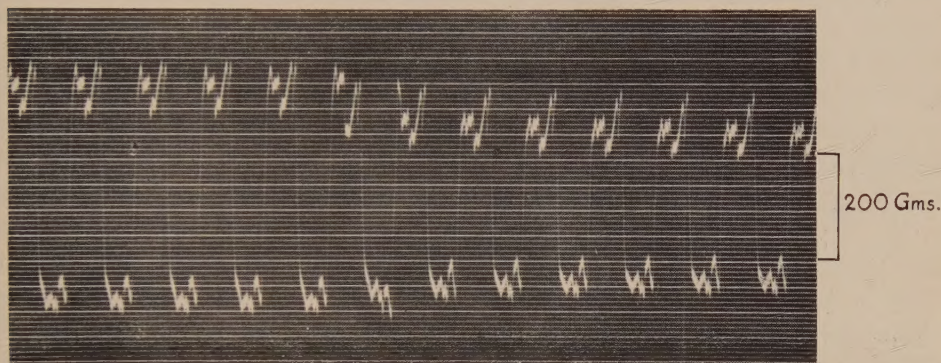


FIG. 8.—The effect of a drop of water on the frictional force between skin and polythene. Rubbing speed 1 cycle in 3 seconds. Vertical load 420 gm.

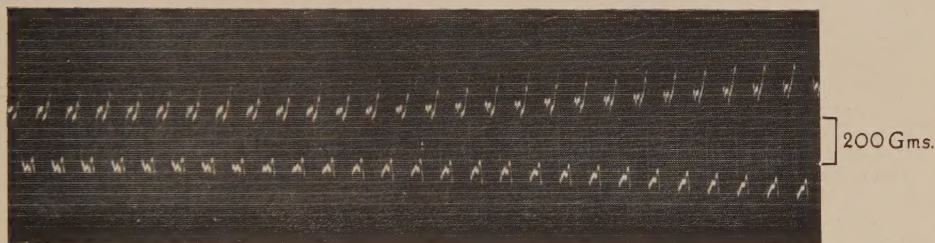


FIG. 9.—The effect of a trace of water on the frictional force between skin and polythene. Rubbing speed 1 cycle in 3 seconds. Vertical load 275 gm.

DISCUSSION.

The results from Experiment 1 show that, during the time of this experiment, the frictional force between skin and polythene was proportional to the load between the two surfaces. It therefore appears justifiable to use the term "coefficient of friction" when describing their relative frictional behaviour.

The results from Experiment 2 show that the coefficient of friction between skin and polythene can vary by as much as 100% on different occasions. These variations were caused by a change in the environmental conditions of the subject.

Experiment 3 shows that variations in the coefficient of friction between skin and polythene depend upon the surface conditions of the skin prevailing at the time of the experiment. Friction between skin and polythene is reduced if the skin is dry, greasy or very wet. Friction is increased if the skin is moist,

The mechanism of these phenomena is not understood. The lubricating effect of oil and excess of water may be ascribed to the formation of a surface film and possibly the conversion of boundary lubrication to hydrodynamic or fluid lubrication. The opposite effect of a trace of water is more difficult to explain. A simple working hypothesis is that with dry skin the surface squames, because of their lamellar structure, act as a dry lubricant in the manner of graphite or talc. When the skin is moist, the relative movement of the squames is impeded, possibly by surface tension, and the frictional force rises. An alternative explanation is that the moisture in some way removes the grease film from the surfaces of the squames and reduces the lubrication between them.

SUMMARY.

The classical concepts of friction and modern views on lubrication are briefly described.

An apparatus is described for rubbing skin at a constant speed and loading weight. The apparatus also records continuously the frictional force between skin and the rubbing agent.

The coefficient of friction between skin and polythene is not a constant value, but depends upon the surface conditions of the skin prevailing at the time of the experiment. The surface conditions of the skin are affected by changes in the environment. Friction between skin and polythene is reduced if the skin is dry, greasy or very wet; friction is increased if the skin is moist.

The material for this paper formed part of a Thesis for the degree of M.D. at the University of Cambridge.

The apparatus was made in the Workshop of the Army Operational Research Group which is under the direction of Mr. E. E. E. Treadwell.

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Figs. 1, 2 and 3 by permission of *J. Sci. Instrum.*

Fig. 5 by permission Editor of *Trans. St. John's Hosp. Derm. Soc.*

REFERENCES.

- LIPPOLD, O. C. J. and NAYLOR, P. F. D. (1951) *J. R. Army med. Cps.*, **96**, 147.
NAYLOR, P. F. D. (1953) *J. sci. Instrum.*, **30**, 390.
VINCI, LEONARDO DA (1938) *The Note books of Leonardo da Vinci*. Arranged, rendered into English and introduced by Edward MacCurdy. London: Jonathan Cape, Ltd., Vol. 1, pp. 615; 621.
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REINFECTION FROM SOCKS AND SHOES IN *TINEA PEDIS*.

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In spite of the use of modern fungicides, *tinea pedis* remains a common condition among servicemen and is now so widespread that the term "service-man's foot" would seem more appropriate than "athlete's foot". It is unfortunate that many patients develop resistant, recurrent and sometimes incapacitating lesions on their feet. Although many surveys have been undertaken to investigate the incidence of fungous infections, little is known of the rôle of footwear in reinfection and many authorities fail to agree whether relapses are due to self reinfection or to fresh infection from other sources. However, it is widely held that the initial attack of *tinea pedis* is caused by contagion from washing places and close living conditions but that subsequent attacks are due to the lowering of the host threshold by heat and moisture. The type of footwear is important in the production of further outbreaks of this disease, for not only do socks and shoes form a permanent reservoir of dermatophytes but they also form a confined moist space which encourages the growth of these pathogens both in the socks and in the skin. Moreover, no easy method of sterilizing footwear on a practical scale has been devised so far.

In a review of the literature, only five reports describing the recovery of pathogenic fungi from footwear have been found. Dermatophytes have been cultured from the leather insoles of infected shoes by Dixon (1924) and by Jamieson and McCrea (1932). More recently Ajello and Getz (1954) cultured scrapings from 100 pairs of used shoes and obtained fourteen cultures of *Trichophyton mentagrophytes* and one culture of *Trichophyton rubrum*. They reported that Fischer grew dermatophytes from only two woollen socks after hundreds of cultural attempts had been made, and said there had been few reports on successful isolations. Bonar and Dreyer (1932) succeeded in growing cultures of *Trichophyton interdigitale* from floor material, and showed that ordinary laundry processes were insufficient to kill the fungus present on clothes. They also said "Fungi actually grow in and on strands of the fabric and digest them so that eventually there is a breakdown and disappearance of the material from which the fabric was composed". Finally Berberian (1938) published a photograph of a culture of *Trichophyton interdigitale* growing naturally on laundered woollen socks which had been incubated in a moist atmosphere at 23° C for three weeks. This experiment has been verified in the present survey after leaving laundered socks unused for five months.

It was the purpose of this investigation to discover the degree of footwear infection and to record the results of clinical observations in a group of men serving at the Royal Naval Barracks, Chatham. As a result of this work, a healthier design of sock and stocking for use in both temperate and tropical climates is suggested.

INVESTIGATION.

One hundred and four patients with proved and 19 patients with suspected tinea pedis and 100 normal control people were examined clinically, microscopically and culturally, for evidence of fungus infection. Material from their footwear was also cultured for pathogenic fungi, involving the examination of 1338 culture plates, and the survey took nineteen months to complete. There was no particular selection of patients and cases were included as occasion arose. The controls were members of the staff and patients with skin complaints not due to tinea and none had lesions on the feet. "Suspected" patients had lesions very suspicious of tinea, but no fungi could be found on microscopy; pathogenic fungi were frequently recovered from their socks, however.

Method.—Each sock was stretched inside out over a bottle and the sole scraped with a flamed scalpel. The debris was collected on sterilized paper, emptied on to malt agar tellurite medium and spread evenly with a glass rod, which was then used to inoculate two further culture plates. The shoe debris was cultured in the same way, using a swab for collection and spreading. The plates were incubated at 23° C. for three weeks before discarding.

Results.—In the proved and doubtful cases the incidence of footwear infection was high (35 of 104 proved, and 6 of 19 suspected patients), but it was low in the control group (5 of 100 patients). This last figure probably represents patients who had been infected at one time and were still carrying spores in their footwear.

The incidence of infected footwear was probably higher than discovered, since only the superficial part of the soles of the socks was scraped. Moreover, many culture plates were discarded because of over-growth by contaminants, and some cultures of the more slowly growing pathogens (e.g. *Epidermophyton floccosum*) may have been hidden by penicillium and aspergillus moulds. *Trichophyton crateriforme* was cultured once in company with *Trichophyton interdigitale* from an infected patient's socks. The dermatophyte almost exclusively found was the last named and since the distinction between this species and *Trichophyton mentagrophytes* is often difficult where these fungi are not quite typical, the name *Trichophyton interdigitale* has been used to cover all these polymorphic types.

A higher incidence of footwear infection occurred in those who had lesions elsewhere on the feet, especially on the soles. In a few cases in which dermatophytes were cultured there was only a mild degree of scaling between the

toes, showing that socks and shoes may be infected although only a mild fungous infection is present. The same proportion of suspected as of proved cases had footwear infection (approximately one-third).

Dermatophytes could be cultured from the socks of patients in the suspected group who had chronic eezematoid areas on the soles, ankles and sometimes the dorsa of the feet. It is considered that these patients originally had a mycotic infection which had slowly changed into a mycotic eczema. No fungus was found in these lesions, which were very recalcitrant to treatment, even mild fungicides often aggravating them. To complicate matters still further, these lesions, which simulated discoid eczema, sometimes became secondarily infected with fungus again. It seems possible that even small amounts of fungus in the footwear could account for these recurring eezemas.

In two cases only the nails were infected and yet there was fungus present in the socks. Twelve pairs of used seaboots were also examined and there was one positive culture.

VIABILITY OF *Trichophyton interdigitale* IN LAUNDERED SOCKS.

This fungus was readily recovered from infected patients' socks laundered either domestically or commercially.

From an infected patient, six pairs of laundered Service-issued cashmere socks, which had been unused for five months, were placed in separate sterilized 1000 ml. conical flasks. The flasks contained 50 ml. of sterile water and were stoppered with cotton wool. After they had been left at 23° C. for three weeks the socks were removed and examined. All socks were heavily contaminated with penicillium mould, especially over the soles but not towards the tops of the socks. On the sole of one sock, three small white powdery colonies of *Trichophyton interdigitale* were seen. They were cut out and incubated in a Petri dish at room temperature but they failed to grow any larger. The experiment was repeated using new Service socks without result and very few contaminants appeared. This fungus can, therefore, survive at least five months in a sock and then grow under moist conditions without the aid of any medium other than the sock-fibres and skin squames.

TRACING SKIN CELLS THROUGH SUCCESSIVE LAUNDERINGS.

The soles and webs of one foot were painted with carbol-fuchsin and the sock on that foot marked with a laundry tag. After being worn for two days, the sock was laundered domestically and separately from the other. It was then worn for a number of successive times on the other undyed foot, after laundering each time, and the sock finally laundered and scraped for collection of debris. Dyed squames of skin from the feet of normal people were traced through six consecutive launderings. The squames may have persisted longer

because the dye used to trace them became fainter with each successive laundering. The experiment was repeated using broad-mesh pure nylon socks and no dyed cells were seen after the second laundering. The whole process was repeated six times for both wool and broad-mesh nylon socks with the same result each time.

Thus, squames of skin which leave the sole of the foot daily evidently tend to remain in the woollen but not the broad-mesh nylon sock, and hence any attached fungus will also persist among the woollen sock-fibres. Moreover in the broad-mesh nylon sock, fungi are less likely to survive laundering since they will be removed physically with the attached epiderm. Any ointment used in treatment is more likely to come into intimate contact with fungi in such socks than in thicker woollen or spun nylon socks. Finally, since there is a close relation between fungi and keratinized epithelium, it is possible that dermatophytes can survive for long periods on this material. Alternatively, they may survive on keratinaceous wool (Bonar and Dreyer, 1932). Fungus has been found to survive long periods of desiccation. Farley (1921) grew *Epidermophyton floccosum* after five months.

It was found that tinea pedis was very common in the Engine Room Branch, where heat and oil penetrate the socks. In the Seaman Branch, where keratolytics in alkaline soap cause desquamation, the incidence was also high. The Royal Marines, who wear thick woollen socks, were also often found to be infected. Mirror image lesions were sometimes seen on the opposite foot which also contained fungus and which must have got there through the sock acting as intermediate host. Although it is commonly held that woollen socks assist the hygiene of the feet by absorption of sweat, the interstices of the fabric form a saturated moist atmosphere and an insulation to heat. Even cotton socks, since they have not a broad enough mesh, tend to hold on to moisture and remain damp. On the other hand, broad-mesh nylon has a transparent mesh, does not become as damp, since it is non-absorbent, and is therefore porous to sweat. Patients did not complain of any lack of cushioning effect even after marching in boots.

Although there are reports of sensitivity to nylon, such cases as may occur are rare and probably no more common than wool sensitivity; it is unlikely that thick broad-mesh nylon will cause dermatitis because of its texture. Spun and reinforced nylon socks tend to promote hyperidrosis if worn in warm weather, and may conceivably cause dermatitis due to sweat retention.

CLINICAL RESULTS.

In eighteen patients in the mycotic group, separate microscopical and cultural examinations were made from each toe-web and toe-nail. It was found that fungus may occur in only one or two places on the feet, although more general

signs of infection may be present. Fungus may be present in an apparently healthy nail and in only one toe-web, not necessarily the fourth.

Skin material was collected aseptically and cultured by a hanging-drop technique (Curry, 1949) using Sabouraud's dextrose agar and malt tellurite agar. A new staining technique was used (Curry, 1949) employing Chlorazol Black "E". A higher percentage of positive results was obtained by this method which was compared with the usual potash method in each case. In one case of every nine fungus could not be seen by the potash method alone. It is considered that errors in the potash method may account for the greater number of mycotic cases reported by other workers (Linn *et al.*, 1941 and Hopkins *et al.*, 1947). Twenty-three patients with tinea pedis yielded cultures of *Trichophyton interdigitale*. In one patient who had tinea of the hand as well, this fungus was cultured from his soles. *Epidermophyton floccosum* was cultured from his toe-webs and also from his infected hand, which had an unusual bullous reaction.

Types of lesions.—All degrees from mild scaling to vesicle formation were seen in the mycotic cases, the presence of vesicles in an initial attack being an almost certain indication of tinea. Scaling was no criterion of fungus infection, and fissures occurred in both main groups. Marginated lesions were uncommon and white macerated skin due to hyperhidrosis rarely had fungus present.

There were three main types: intertriginous, vesicular and squamous. Brown vesicular areas were frequently seen in the centre of the soles, often in a line indicating direct spread of infection. These lesions, produced by the same species of fungus as was present in the squamous type, appear to be due to reactivation of latent infections. Hyperkeratotic lesions were not seen. Eczematoid areas on the soles were common and infection of the dorsum of the foot was not uncommon, especially where exposure to diesel oil was a factor. In 16 patients the toe-nails were infected, 11 of them clinically. Three had tinea of the finger-nails as well.

No less than 36 of the 104 patients with tinea pedis had mycotic or associated lesions on other parts of the body. Of these, 6 had tinea cruris and 8 tinea of the hands.

Acute symmetrical -ide eruptions on the hands and fingers were commonly seen. Tinea of the hands was very deceptive and usually small amounts of mycelium only were seen. The clinical picture was very variable, there being often only a diffuse scaly erythema appearing anywhere on the hands and fingers. Two cases of nummular trichophytides were seen on the limbs.

Hyperhidrosis occurred more commonly in the mycotic group and hygiene was generally poor; but cleanliness was no preventive. The majority of proved and suspected patients gave a history of previous attacks and in some cases as long as 15 years had elapsed since the initial attack. Trauma seemed to be a predisposing factor in some cases. Tinea pedis also occurred far more commonly

in those who had served abroad. Mycelium was always easily demonstrated in the early lesions, but in the chronic lesions, which later occurred in the same patients, fungus was rarely if ever found.

CONCLUSIONS.

1. The fact that tinea pedis is such a common condition among servicemen and that it is so often followed by relapse may be explained by the ease with which contagion may occur in the first instance, and by the permanent reservoir of fungi which the footwear then becomes.

2. It is considered that the permanent retention of fungus-laden epidermal scales in the wool and cotton matrices of the sock is an important cause of relapse under hot moist conditions.

3. Since the fungicide which will cure tinea pedis remains to be found, the best compromise in this problem seems to be the improvement of the hygienic conditions of the feet by providing a healthier design of sock.

4. Although no clinical trials have been done with broad-mesh nylon, this type of sock is suggested as a suitable substitute for wool and cotton socks.

The helpful criticism is acknowledged of Dr. R. W. Riddell, Senior Lecturer in Medical Mycology, Institute of Dermatology, London, Dr. J. Curry, Lecturer in Mycology and Dermatology, University of Manchester and Dr. M. B. Sulzberger, Chairman of the Dermatology, Skin and Cancer Unit, New York.

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REFERENCES.

- AJELLO, L. and GETZ, M. E. (1954) *J. invest. Derm.*, **22**, 17.
BERBERIAN, D. A. (1938) *Arch. Derm. Syph., Chicago*, **38**, 367.
BONAR, L. and DREYER, A. D. (1932) *Amer. J. publ. Hlth*, **22**, 909.
CURRY, J. (1949) *Brit. J. Derm. Syph.*, **61**, 54.
DIXON, H. A. (1924) *Canad. med. Ass. J.*, N.S. **14**, 1097.
FARLEY, D. L. (1921) *Arch. Derm. Syph., Chicago*, **3**, 759.
HOPKINS, J. G., HILLEGAS, A. B., LEDIN, R. B., REBELL, G. C. and CAMP, E. (1947) *J. invest. Derm.*, **8**, 291.
JAMIESON, R. C. and MCCREA, A. (1932) *Arch. Derm. Syph., Chicago*, **25**, 321.
LINN, L. W. and MAGAREY, F. R. (1941) *Med. J. Aust.*, **2**, 452.
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ULCERATIVE CUTANEOUS LESIONS IN SARCOIDOSIS.

Report of a Case with Clinical Resemblance to Papulonecrotic Tuberculide.

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KLAUDER (1925) and Klauder and Weidman (1926) were the first to report a case of ulcerative sarcoidosis. Their patient, a Negro woman aged 23, had a generalized eruption consisting of scaly papules and nodules, many of which ulcerated. Clinically, the split pea-sized nodules resembled those of Boeck's sarcoid. There was an associated enlargement of the superficial and mediastinal lymph nodes and a roentgenogram of the phalanges showed cyst-like areas. The reaction to tuberculin and the guinea-pig inoculation were negative. Histological examination of a cutaneous lesion disclosed sarcoid-like granulomas, some of which showed necrotic centres; numerous giant cells were also present. The authors interpreted the histological picture as that of tuberculosis. About a year later acid-fast bacilli were detected for the first time in the sputum of this patient and shortly thereafter she expired. Autopsy disclosed extensive caseous necrosis in the intestines, mesenteric lymph nodes and lungs; tubercle bacilli were found in smears from the latter organ.

A decade later, Klauder and Weidman (1935) reported a similar case. Klauder considered this disease to be an unusual type of tuberculosis occurring chiefly in the Negro. Weidman supported this concept but classified this uncommon clinical entity as a variant of Boeck's sarcoid. Other cases of ulcerative sarcoidosis in the Negro have since been reported (Goeckerman, 1928; Harrel, 1940; Sones *et al.*, 1951; Robinson and Hahn, 1947; Canizares, 1952; Sullivan, 1939). Moreover it has also been observed in the white race (Ronchese, 1951; Jamieson, 1938).

The clinical similarity of some ulcerative cutaneous lesions of sarcoid to papulonecrotic tuberculide is remarkable. The simultaneous development of Boeck's sarcoid with papulonecrotic tuberculide, though possible, is unlikely because of dissimilar reactions to tuberculin in these diseases. In sarcoid positive anergy is the rule while hyperergy is invariably present in the other. Cases have been reported in which histological examination of clinically different lesions in the same patient showed the features of Boeck's sarcoid in one and those of papulonecrotic tuberculide in the other, the response to tuberculin being of the positive anergic type (Silver, 1940; Leifer, 1938;

Heisel and Krause, 1942). Despite persistence of positive tuberculin anergy, histologically proved papulonecrotic tuberculide has been recorded as developing in sarcoidosis (Rubin and Pinner, 1944).

Jamieson (1938) presented a white patient with sarcoidosis, the cutaneous lesions of which simulated papulonecrotic tuberculide. He stated that the histologically proved ulcerative sarcoid lesions on the upper extremities were indistinguishable clinically from those of papulonecrotic tuberculide. This observation was timely and of interest for it conveyed the impression that, heretofore, these diseases might have been mistaken for one another regardless of histological study.

I wish to record a case of ulcerative cutaneous sarcoid which had a striking clinical resemblance to papulonecrotic tuberculide.

CASE REPORT.

An American Negro woman aged 25 presented herself at the clinic seeking relief for a generalized cutaneous eruption and a slightly productive cough of 2 months' duration. During the preceding year she had complained also of anorexia, weakness and a weight loss of 15 pounds. There was no family or personal history of either syphilis or tuberculosis.

Three years prior to admission routine serological tests for syphilis were reported as positive and she received at that time 10 daily intramuscular injections of 600,000 units each of procaine penicillin. During her present admission she again received penicillin therapy in similar dosage for 15 injections without effect on the cutaneous lesions.

At its onset the eruption consisted of a few crusted lesions on the upper extremities. These lesions disappeared within a few weeks only to recur thereafter in large numbers in the same locations. A few weeks later similar lesions were noted on the lower extremities and then elsewhere; within 2 months the eruption became widespread.

The generalized symmetrical nonpruritic eruption was most conspicuous on the extremities, the lesions on the extensor aspects predominating (Fig. 1). Less numbers were present on the back, abdominal wall and over the gluteal region. A few lesions were observed on the scalp and in the oral cavity but the palms and soles remained free. The ulcerative character of the eruption was most conspicuous. The lesions varied in size from that of a match head to that of a split pea and some were slightly larger. They were chiefly discrete but on occasion they grouped and a few coalesced to form small irregularly shaped ulcerations. The majority of lesions were capped by closely adherent rupial crusts and their forceful removal exposed flat shallow ulcers with smooth red moist bases. Resolved lesions left deep-seated deformed pinkish scars which later became either flesh coloured or hyperpigmented.

Pin-point to pin-head sized flesh coloured and pinkish firm papules, the majority of which were surmounted by tiny central crusts, were sparsely scattered over the upper extremities, face, ears and thighs. These minute crusted lesions left tiny flat scars on resolution.

Small numbers of firm discrete well defined pea-sized intracutaneous and subcutaneous nodules were dispersed chiefly over the upper extremities; less numbers were noted on the lower extremities, back and on the abdominal wall. On the extremities they affected equally the extensor and flexor aspects. The few intracutaneous nodules noted were pinkish but as the inflammatory aspect subsided they assumed a brownish colour of different shades. The subcutaneous nodules were flesh coloured and

the majority could be detected only by palpation. During prolonged observation these lesions did not ulcerate and they resolved slowly leaving no sequelae.

Several pea-sized discrete lymph nodes were palpated in the epitrochlear, posterior cervical and inguinal regions. The spleen was felt 2 fingerbreadths below the costal arch; its free border was smooth, thick and not tender. The systolic blood pressure was 110 and the diastolic 70 mm. Hg.

The blood Kolmer was 4 plus and the VDRL 2 plus. An intracutaneous injection of 0.05 c.c. of old tuberculin in dilution of 1 : 100 gave a negative result. The serum albumin was 1.5 g. and globulin 7.2 g. per cent. Blood count: Hb 56%, RBC 3,750,000; WBC 11,500.



FIG. 1.—Ulcerative cutaneous sarcoid simulating papulonecrotic tuberculide.

Repeated sputum examinations for acid-fast bacilli were negative. A culture of the discharge from an ulceration failed to grow tubercle bacilli.

Urine: 1 plus albumin. Blood sugar and liver function tests were normal.

A roentgenogram of the chest showed a fibroproductive infiltration in both upper lobes of the lungs. A roentgenogram of the hands and feet showed no evidence of osseous involvement. However, at another hospital, about 2 months later, a similar examination showed cyst-like lesions in the middle phalanx of the right second toe and in the phalanges of the left third finger.

Histological Examination.—Ulcer: The richly vascular oedematous granulation tissue occupied the entire cutis and it contained a single narrow dense band-like infiltration of epithelioid cells which extended vertically through the lesion. Here a moderate number of Langhans giant cells and one of the foreign body type were observed. Along one border of the section an extensive irregular area of necrosis was noted and about it were scattered variable numbers of epithelioid cells. The opposite margin was occupied by small aggregates of epithelioid cells which fringed bits of necrotic tissue. The lesion presented evidences of secondary infection. Moderate numbers of lymphocytes were dispersed throughout and a few plasma cells were detected in the deeper parts of the lesion. The deep cutis and subcutis were

replaced by a richly cellular fibroblastic tissue which extended horizontally through the lesion. Within this dense connective tissue, in the upper subcutis, were two adjacent "naked" epithelioid tubercles, the larger containing several Langhans giant cells while the smaller contained but one. These tubercles lay directly below the diffuse epithelioid cell infiltration in the cutis. A Ziehl-Neelsen stain failed to show acid-fast bacilli. (Fig. 2).

Subcutaneous Nodule (A): The inflammatory process affected the deep cutis and the entire subcutis but it was most severe in the upper half of the latter layer. Dense numbers of fibroblasts penetrated the involved areas. These cells appeared to originate in the perivascular tissues and they extended outward in all directions enveloping a large "naked" tubercle in the upper subcutis on one side of the section, a similar but smaller nodule at the same level on the opposite side and a still smaller epithelioid tubercle in the centre of the section at a slightly lower level. The latter, bordering a capillary, was partly enveloped by small numbers of lymphocytes and a few plasma cells. There was a scattering of lymphocytes and occasional minute collections of plasma cells were detected throughout the affected regions. Necrosis was not observed and giant cells were absent. A few blood vessels were congested and several adjacent small haemorrhages were noted. There was evident proliferation of the lining endothelial cells.

Subcutaneous Nodule (B): The pathological changes were confined to the subcutis. Multiple irregular foci of necrosis traversed this area and they were enveloped by large dense accumulations of epithelioid cells. A few epithelioid tubercles, some with necrotic centres, were likewise detected here. Giant cells were absent. The perivascular lymphocytic infiltrates were not prominent; small numbers of polymorphonuclear leucocytes, an occasional plasma cell and a few fibroblasts were also noted. The epithelioid cell infiltrates were admixed lightly with lymphocytes. The blood vessels, some with thickened walls and a few showing a mild endothelial reaction, were dilated and a few were filled with polymorphonuclear leucocytes. Dense columns of fibroblasts appeared to contain the granuloma. A Ziehl-Neelsen stain failed to disclose acid-fast bacilli. (Fig. 3).

Except for the irregular deep-seated scars and the subcutaneous nodules, the clinical characteristics of the eruption were similar to those of papulonecrotic tuberculide in the Negro. However, the positive tuberculin anergy, the hyperglobulinemia, the splenomegaly, the osseous involvement and the inability to find tubercle bacilli in the sputum pointed to sarcoidosis as the most logical diagnosis. The association of active pulmonary tuberculosis with papulonecrotic tuberculide is uncommon while the reverse is true as regards pulmonary involvement in sarcoidosis. Moreover, the Negro with papulonecrotic tuberculide is invariably highly sensitive to tuberculin; thus, the hypoergic response in this case likewise tended to eliminate this diagnosis. Histologically, the lesions were suggestive of both sarcoid and tuberculosis.

DISCUSSION.

There is no uniformity of opinion regarding the aetiology of sarcoidosis. The discussion of this highly controversial issue is not within the scope of this paper and would be merely repetitious and trite. American dermatologists have stressed the importance of tuberculosis as the aetiological factor in sarcoidosis

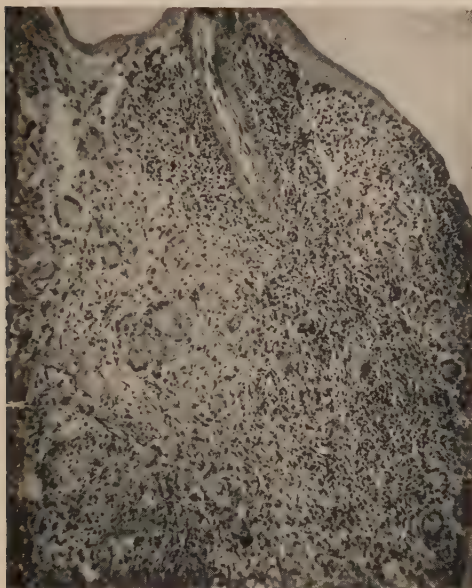


FIG. 2.—A lesion shown in Fig. 1. The granulation tissue resembles that seen in tuberculosis. H. & E.

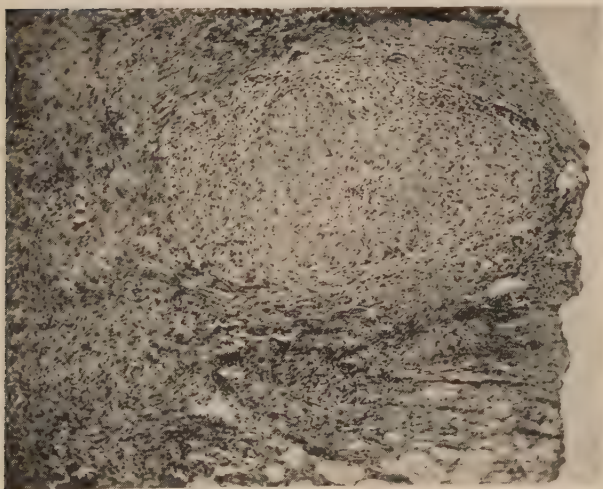


FIG. 3.—A subcutaneous nodule. The maximum reaction at the site of the tubercle is present in the deep cutis and upper subcutis. H. & E.

in the Negro. It is considered to be a haematogenous tuberculosis assuming sarcoid features owing to an unusual immunological reaction (Thomas, 1943).

In general, the histological picture of sarcoid is not pathognomonic (Schaumann, 1924) and in the Negro it is undependable for accurate diagnosis (Weidman, 1950). According to Weidman (1936) the histological picture of ulcerative sarcoid is that of tuberculosis. Nevertheless, he believes that this ulcerative disease should be included under Boeck's sarcoid even though it differs from the type originally described by Boeck (Klauder and Weidman, 1935).

The present case of ulcerative sarcoidosis occurred in a young American Negro woman. The eruption consisted of ulcerative match-head to split pea-sized chiefly discrete cutaneous lesions and split pea-sized discrete non-ulcerative subcutaneous lesions. The cutaneous lesions had a remarkable clinical resemblance to papulonecrotic tuberculide. That this eruption was an ulcerative sarcoid is based on the positive tuberculin anergy, the hyperglobulinemia and the presence of characteristic osseous lesions which Schaumann (1924) believed were pathognomonic of sarcoidosis. Moreover, I have not seen such irregular deep seated scars, similar subcutaneous lesions or splenomegaly in the Negro with papulonecrotic tuberculide.

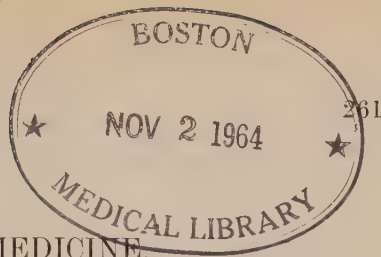
SUMMARY.

A case of ulcerative cutaneous sarcoid is presented. It developed in a young American Negro woman and it had a striking clinical resemblance to papulonecrotic tuberculide.

A complete study of each suspected case of ulcerative cutaneous sarcoid is essential for diagnosis since histological examination alone is not dependable.

REFERENCES.

- CANIZARES, O. (1952) *Arch. Derm. Syph., Chicago*, **65**, 754.
 GOECKERMAN, W. H. (1928) *Ibid.*, **18**, 237.
 HARRELL, G. T. (1940) *Arch. intern. Med.*, **65**, 1003.
 HEISEL, E. B. and KRAUSE, M. E. (1942) *Arch. Derm. Syph., Chicago*, **46**, 575.
 JAMIESON, R. C. (1938) *Ibid.*, **38**, 297.
 KLAUDER, J. V. (1925) *Ibid.*, **12**, 171.
 ——— and WEIDMAN, F. D. (1926) *Ibid.*, **13**, 675.
 ——— (1935) *Ibid.*, **31**, 421.
 LEIFER, W. (1938) *Ibid.*, **38**, 457.
 ROBINSON, R. C. V. and HAHN, R. D. (1947) *Arch. intern. Med.*, **80**, 249.
 RONCHESI, F. (1951) *Arch. Derm. Syph., Chicago*, **64**, 806.
 RUBIN, E. H. and PINNER, M. (1944) *Amer. Rev. Tuberc.*, **49**, 146.
 SCHAUMANN, J. (1924) *Brit. J. Derm. Syph.*, **36**, 515.
 SILVER, H. (1940) *Arch. Derm. Syph., Chicago*, **42**, 522.
 SONES, M., ISRAEL, H. L., DRATMAN, M. B. and FRANK, J. H. (1951) *New Engl. J. Med.*, **244**, 209.
 SULLIVAN, M. (1939) *Arch. Derm. Syph., Chicago*, **39**, 898.
 THOMAS, C. C. (1943) *Ibid.*, **47**, 58.
 WEIDMAN, F. D. (1950) In discussion on Leavell, U. W. *Arch. Derm. Syph., Chicago*, **61**, 156.
 ——— (1936) In discussion on Pillsbury, D. M. *Ibid.*, **33**, 764.



ROYAL SOCIETY OF MEDICINE.

SECTION OF DERMATOLOGY.

President—Dr. REGINALD T. BRAIN.

18 November 1954.

Nodular Dermal Allergide (Trisymptome de Gougerot).—Dr. C. D. CALNAN.

Miss P. C—, aged 41.

History.—One year ago her illness began with stiffness of the knees for which she attended a rheumatism clinic. No evidence of arthritis was found. She was treated with general U.V.R. and the skin eruption began then.

She describes urticarial wheals that give place to flat lumps and these leave residual discoloration. Only the legs are affected. Some lesions are painful. When first seen in April 1950 she had an erythematous eruption on the lower legs with purpura.

The course of the eruption has been continuous.

Past history.—Urticaria in childhood. Pruritus ani for 11 years. Boils and styes. Carious teeth for 10 years—awaiting extraction. 1938: Infected parotid gland. 1945: Anaemia and nutritional deficiency. 1947: Pelvic abscess treated with penicillin. 1952: Acute sinusitis; left antrum opaque.

Examination.—The eruption on the legs is essentially pleomorphic and not all the elements are present at one time. The urticarial wheals are of short duration. There are small, flat, erythematous papules on the lower legs and larger flat nodules on the thighs. The sites of previous nodules are seen as dusky pigmentation. Purpura now is absent.

Investigations.—E.S.R., 47 mm. in 1 hour. W.B.C., 5600/c.mm. *Differential:* Polymorphs, 78%; eosinophils, 2%; lymphocytes, 19%; monocytes, 1%.

Urine, normal. Skiagram of chest, normal.

Histology (Dr. Haber).—There is a widespread perivascular and periacinous inflammatory reaction. It involves the upper, middle and lower corium where it also penetrates the upper lobes of the fat tissue. The infiltrate consists of round cells, polymorphs and eosinophils. The vessels show endothelial swelling and proliferative endarteritis but thrombosis could not be demonstrated. Many polymorphs show fragmentation of their nuclei and the wall of one particular vessel shows fibrinoid necrosis. Gram stain did not reveal any organisms. *Diagnosis:* Allergic vasculitis.

A generally accepted term is desirable to identify this condition, which is a recognizable entity. The main support for calling it an allergide is the histological evidence. This patient has ample evidence of focal sepsis, but one cannot prove any connection.

Nodular Dermal Allergide (Gougerot).—Dr. G. A. BECK.

A woman aged 42.

History.—From the age of twenty-three she has had crops of nodules on legs and thighs occurring every few days. During this time there have been two long remissions with no lesions for periods of eighteen months and four years respectively.

One or many lesions appear, usually in the evening, as throbbing tender white lumps in the skin. Next morning they are less painful and by then the skin over them is bright red. The pain never lasts more than two days. The lesions slowly fade to a purplish macule, during which phase they sometimes irritate. They disappear without trace during the second week.

The majority of lesions are on the legs though more recently there have been similar lesions on the thighs. With the more violent crops there is at times a diffuse painless swelling around the knee or ankle joints. Her general health has remained good throughout, except for a period in 1946 when she was treated for thyrotoxicosis by partial thyroidectomy. She was investigated for sterility in 1942, but no abnormality other than a small fibroid in a retroverted uterus was found.

Clinical findings.—She was observed at hospital from November 1941 to October 1943. No constitutional abnormalities were found. During an admission for two weeks she developed no lesions and was afebrile throughout. During a severe attack in September 1942, in addition to the usual nodules, there were numerous flat erythematous patches with purpura. In 1943 she started treatment with calcium gluconate. She herself attributes a steady improvement to this until about 1949, when the lesions ceased for four years. Five months ago they recurred and have persisted, although she again reports a reduction in the number and severity since starting calcium by mouth and by injection.

She returned to hospital in October 1954. Again no abnormality was found on general examination. B.P. 120/80. Pulse regular, 72. Urine normal to routine tests. Lesions starting the evening before the day of examination show as shiny, yellowish-pink, slightly indurated spherical nodules up to 1 in. in diameter. In addition to a variable small number of these recent lesions there are numerous fading macules in various stages between the nodules and a faint purplish stain.

There has been no purpura and no joint swelling during this period of observation.

Investigations.—November 1941: Haemoglobin, 102%. Red blood cells, 5,280,000. White blood cells: 9,400; polymorphs, 53%; lymphocytes, 39%; monocytes, 4%; eosinophils, 4%. Platelets, 250,000. Coagulation time, 1½ minutes. Bleeding time, 1½ minutes. Capillary resistance test—negative. Ascorbic acid saturation test showed no deficiency. Skiagram of chest and hands—normal.

Biopsy (19 November 1941).—Histological report: Some epidermal atrophy with hyperkeratosis. Zones of inflammation are present around hair follicles and sweat glands. Polymorphs and eosinophils are present in the inflammatory zones.

October 1954: Haemoglobin, 92%. White blood cells, 6,800: neutrophils, 70%; lymphocytes, 18%; monocytes, 8%; eosinophils, 4%. E.S.R., 11 mm. in 1 hour. No L.E. cells were seen. Mantoux test 1:1000, positive.

Cutaneous Allergic Arteriolitis (Two cases).—Dr. H. HABER and Dr. H. WILSON.

CASE 1.—Shorthand-typist aged 24.

History.—In March 1954 she had acute tonsillitis for which she took 4–6 tablets of sulphatriad. Three days later she noticed a morbilliform rash on the legs. After six days pustules appeared around the feet and ankles of both legs and burst, leaving small necrotic ulcers. A few days afterwards she noticed swelling of the ankles. She was admitted to hospital 25 March 1954 and the ulcers healed without active treatment.

On 10 April 1954 she was discharged and kept under observation. Since then there has been an occasional pustule on the legs but no necrotic ulcers.

Past History.—Cheiropompholyx some years ago.

Family History.—Nil relevant.

On Examination.—A crop of small pustular and necrotic lesions resembling a papulo-necrotic tuberculide on the lower parts of both legs. She now shows no active ulcers but scars of the original ones.

Pulse regular. B.P. 140/80. Heart sounds normal. Tonsils enlarged, fauces reddened. No lymphadenopathy.

Alimentary system.—Normal.

Central Nervous System.—Normal.

Investigations.—*Histology* (29 March 1954): Acute purulent inflammation and fibrinoid necrosis of several arterioles in the dermis and superficial subcutis. Severe necrotic, purulent and haemorrhagic inflammation of related skin with ulceration and scab formation.

Urine (26 March 1954): Occasional red cells and leucocytes. No casts or crystals seen. Culture *B. coli*.

(6 April 1954) No casts, crystals, leucocytes, red cells or organisms seen. Culture. No growth.

Throat Swab (10 April 1954): Good growth of β -haemolytic streptococci.

Blood count, (26 March): Hb. 84%. P.C.V. 40%. W.B.C. 9,000. Neutros., 76. Lymphos., 18. Monos., 6. Eos., 0.

E.C.G. (31 March 1954): Normal.

Skagrams: Paranasal Sinuses.—Uniform opacity of the right maxillary antrum and mucosal swelling of the left antrum. No infective changes seen in the frontal sinuses or ethmoids.

Plasma Proteins.—Total protein 6.0 g per 100 ml.; albumin 4.4 g.; globulin 1.6 g.

CASE 2.—A salesman aged 54.

History.—In December 1952 this patient had acute follicular tonsillitis which was treated with sulphatriad for five days. A week later there appeared round both ankles red macules which rapidly broke down to form necrotic ulcers about $\frac{1}{2}$ –1 cm. in diameter. He attended hospital in January 1954 when a biopsy was done. During the next three weeks the ulcers increased in size and number, and the biopsy wound broke down to form a shallow ulcer about 2 cm. in diameter. Both ankles became swollen and painful at this time. He was admitted to hospital in March 1953 and the ulcers slowly healed but recurred soon after his discharge. He was readmitted in October 1953 and treated with ACTH 25 mg. four times daily for three weeks. This was gradually reduced until his discharge in December 1953. He continued to receive ACTH gel 12 $\frac{1}{2}$ mg. daily as an out-patient. Further relapse caused him to be readmitted in February 1954 when ACTH 25 mg. daily in an intravenous drip much improved his condition. He was discharged in April 1954 and received ACTH gel 20 mg. daily as an outpatient. There was fresh ulceration within a month of his discharge uncontrolled by ACTH gel or cortisone, 50 mg. daily. Since September 1954 he has had no further cortisone but has been given hydrocortisone locally to the remaining active ulcers. During October his condition has steadily improved.

Past history.—1948: Pneumonia—treated with sulphapyridine.

Family history.—Wife and three children—alive and well. No family history of cutaneous or allergic disease.

On Examination.—A well-built man with normal skin except for a number of necrotic ulcers on the legs, chiefly around the ankles and on the shins. Most of these have healed and left scars. Between the scars the skin is bluish and pigmented with many small petechiae, particularly on the right leg. There is oedema of both ankles.

No cardiac abnormality. Pulse regular; B.P. 140/90.

Chest and C.N.S.—Nil abnormal.

Urine.—No albumin or sugar.

Investigations.—(6 February 1953): *Histology from right ankle.* Fibrinoid necrosis and leucocytic infiltration of arterioles mainly in the dermis with leucocytic infiltration of the perivascular stroma.

(31 March 1954) *E.C.G.*: No abnormality.

(30 September 1954) Urea clearance: First hour 94%; second hour 80.2%, normal. Urine: No cells, casts or crystals seen.

(26 March 1954) Hb. 102%. P.C.V. 49%. W.B.C. 13,000. Neutros., 72%. Lymphos., 22%. Monos., 5%. Eos., 0. E.S.R. 24 (corrected).

(19 February 1954) Plasma proteins: Albumin 4.4, globulin 1.85. Total proteins, 6.25.

(7 April 1954) Skiagram of paranasal sinuses—no abnormality. Skiagram of chest—bronchitic changes.

(11 October 1954) Intradermal tests to standard bacterial suspensions showed no abnormality.

The histology, although characteristic, is not absolutely diagnostic of the condition, as it may occur in a number of other dermatoses. Urticaria, erythema multiforme, staphylococcal, streptococcal and meningococcal rashes. Erythema annulare rheumaticum, erythema elevatum diutinum and the Arthus phenomenon all have a similar histology. Perhaps the whole group of these conditions belongs to the same spectrum of vascular response due to toxic and allergic stimuli.

Onychomycosis caused by *Scopulariopsis brevicaulis*.—Dr. R. J. CAIRNS and Dr. H. G. CLOSE.

CASE 1.—A housewife aged 30. The left big toe nail was injured fifteen years ago and it has remained discoloured along the free margin. The opacity and discoloration spread proximally and for the last two years most of the nail has been affected. Cultures gave a pure growth of *Scopulariopsis brevicaulis*. Removal of the nail in May 1954 has been followed by the slow growth of a new nail which, although clinically infected, has not yielded any fungus on culture. The scaly eczema of the hands and feet has been consistently negative for fungus examination.

On examination.—The new nail shows a dirty white opacity along its distal edge. The free margin is slightly convex and there is some debris beneath.

Investigation.—Section of the nail stained with periodic acid-Schiff shows numerous groups of spores, admixed with short mycelia, and the nail substance itself is invaded by hyphae.

CASE 2.—A housewife aged 62. A subungual haematoma followed an injury to the left big toe nail thirty years ago. There has been debris beneath the nail. The nail was removed in July 1954. Culture produced a pure growth of *Scopulariopsis brevicaulis*, and the new nail appears to be infected.

On examination.—The distal third of the nail is opaque and there is some heaping up of debris under one corner.

CASE 3.—A housewife aged 48. Two years ago the left big toe nail became white and difficult to cut. Soon afterwards it took on a yellowish tint and a large amount of debris appeared beneath it. It cracks and catches on her stockings. Six months ago the right big toe nail became similarly infected.

On examination.—The toe nail is opaque and deformed. In several areas there are rather yellowish patches and elsewhere there are brown streaks. There is heaping up of debris beneath the free margin of the nail. Several other toe nails show white flecking.

Investigation.—Cultural examination—*Scopulariopsis brevicaulis*.

Comments.—From these three cases of onychomycosis *Scopulariopsis brevicaulis* was isolated in pure culture. The diagnosis in the third case was made clinically before the cultural examination was available. Direct tissue mounts in 20% potassium hydroxide showed masses of thick-walled spores with relatively few hyphae. Section of the nail and selective staining for fungus has demonstrated true invasion of the nail substance with mycelial elements.

Scopulariopsis brevicaulis is a fungus very widespread in nature and its pathogenic role has always been doubted. The use of modern staining techniques demonstrates that the nail may be invaded by the fungus and perhaps trauma is a predisposing factor. The clinical appearance of the nail seems to be fairly characteristic. The deformity and opacity begins distally and spreads ultimately to involve the whole

of the nail substance. Well defined areas of different colour are seen varying from a dirty white yellowish tint to a brown or green. Subungual debris is a feature.

The only case so far reported in Great Britain was that of Martin-Scott and the fact that these three cases have been seen in the course of the year suggests that this condition may not be uncommon.

I am indebted to Dr. J. Walker for the cultural examination.

REFERENCE.

MARTIN-SCOTT, I. (1954) *Trans. Brit. mycol. Soc.*, **37**, 38.

The following cases shown have been published in *Proc. roy. Soc. Med.*, **48**, 173 :

Berylliosis.—Dr. I. B. SNEDDON.

Dermatitis Herpetiformis (Erythematous-squamous type).—Dr. I. B. SNEDDON.

Diffuse Pigmentation in Brothers.—Dr. J. S. PEGUM.

The following cases also were shown :

Pityriasis Lichenoides et Varioliformis.—Dr. J. S. PEGUM.

Necrobiosis Lipoidica (Non-diabetic).—Dr. C. H. WHITTLE and Dr. P. J.

FEENY.

Tinea Capitis (Microsporon ferrugineum—Ota).—Dr. P. J. FEENY.

BOOK REVIEWS.

THE FRENCH ATLAS.*

IN the sixth section of the Atlas, the general class of what we should call reticulosos is called "Haematodermias" and, although these are defined as dermatoses resulting from disorders of the blood and haemopoietic system, they are subdivided into leucoses (e.g. leucoblastoses, reticulosarcoma, multiple myeloma), reticulosos (characterized by proliferation of identifiable reticulum-cells), and granulomatoses such as mycosis fungoides. Separate sections are devoted to mycosis fungoides, reticulosis, etc. It seems very doubtful whether this type of classification, based upon sharp distinctions between cell morphology, serves much purpose; so far as the Atlas is concerned, it is of little help, and we find, for example, a picture of "malignant reticulosis" in the section on reticulosos, which the authors quite rightly say would be clinically labelled mycosis fungoides.

This number also contains a section on warts, common plane and plantar. The authors mention that this virus is identical with that of genital filiform warts; nevertheless the latter are given an entirely separate section under the name of "Venereal Vegetations". The observation that these lesions are habitually venereal is difficult to accept.

The seventh section contains some excellent pictures and text, which call for no special comment. There is an interesting short discussion on the relationship between adenoma sebaceum of the Balzer type, and Pringle's type, Bourneville's disease and epithelioma adenoides cysticum; and a longer discussion on various aspects of zoster. Also included are sections on sarcoidosis, keloid, neurofibromatosis and pityriasis rubra pilaris.

The eighth section includes illustrations of Koenen's tumours, tinea amiantacea, two syphilides, and a number of pyococcal disorders. Among the latter are included the dermo-epidermites which include conditions that British dermatologists loosely call "seborrhoeic". In the text treatment of the disorders illustrated is considered. Sometimes these sections are rather disappointing; certainly the newer ointment bases are very seldom mentioned and the antibiotics receive scant consideration. The treatment given in impetigo contagiosa, for example, lists mainly the old-fashioned remedies containing mercury etc., while the antibiotics are mentioned as briefly as possible; perhaps the authors are right.

The ninth fascicule is devoted mainly to fungus infections including moniliasis. In general the previous high standards are preserved, though two pictures of the hands are not quite up to the mark. It is interesting in the text to see mention of favus of the almost sub-clinical type, which has been shown at clinical meetings in London, and in which diagnosis may be difficult. This type of favus is not illustrated, though perhaps it will be represented later on. The text continues its high standard and is so concise that every word needs to be carefully read.

In the Spring it is the custom of Parisians to gather lilies of the valley in the woods surrounding the city. From this they are particularly likely to develop an eruption

* *Atlas de Dermatologie*. By P. DE GRACIAISKY and S. BOULLE. Paris: Librairie Maloine S.A., 1952. 320 coloured plates. To be issued in 20 parts. Price 2000 francs each. Obtainable from H. K. Lewis, London. Prospectus free on request. Parts VI, VII, VIII, IX and X. For reviews of previous sections see this Journal, 65, 105 and 66, 32.

due to the urticating hairs of caterpillars. This produces an eruption excellently illustrated here of fine, red papules limited to the exposed parts. Since these fine hairs drift in the air, the eruption appears on the face and neck as well as on the limbs and the diagnosis is made chiefly on the history. Similar eruptions have been described in the United States of America, but do not often seem to occur in the United Kingdom.

The tenth section also includes illustrations of actinomycosis, Ehlers-Danlos syndrome, alopecia areata and pseudopelade. It is good to see that these authors have given up the syphilitic aetiology of alopecia areata as of psoriasis, which, in the past, has perhaps received too much emphasis in the French School; nevertheless, two pages are devoted to tenuous theories of the cause of alopecia areata. The section on pseudopelade contains a particularly good discussion of the nature of this disorder and summarizes the authors' views that a pseudopeladic state may be produced by a variety of mechanisms, each of which should be carefully sought in the individual case. The section on psoriasis is followed by purpura and trichotillomania. All of these are beautifully illustrated and excellently described in the text.

F. R. B.

A HISTORY OF DERMATOLOGY IN PHILADELPHIA.*

WELL known to British dermatologists through his many learned and readable publications on the history of scabies, Dr. Reuben Friedman, Clinical Professor of Dermatology at Temple University School of Medicine, Philadelphia, has now given us a magnum opus, which can fairly be described as a labour of love. This handsomely produced and lavishly illustrated volume bristles with erudition, the fruit of painstaking research into archives and records. Some of the chapters make fascinating reading, while others furnish useful material for reference. That remarkable personality, Louis A. Duhring, is presented to us in several memoirs and in his own letters and addresses. Among the most interesting chapters may be mentioned the accounts of the American Hospital for Skin Diseases and of the teaching of dermatology in the medical schools of Philadelphia, and the biographies of John V. Shoemaker, John H. Stokes, Donald M. Pillsbury, and Herman Beerman. A pleasing feature of the book is the skilful way in which the colourful procession of men, institutions and events in dermatology is displayed on the broad background of Philadelphia's history. The absence of an index is not only regretted, but deplored.

W. R. B.

**A History of Dermatology in Philadelphia: including a Biography of Louis A. Duhring, M.D., Father of Dermatology in Philadelphia.* Written and Edited by REUBEN FRIEDMAN. (1955) Fort Pierce Beach, Florida: Froben Press, Inc. Pp. 556. Figs. 136. Price \$10.00.

CURRENT LITERATURE.

PRESIDENTIAL ADDRESS: THE CHRONICLE OF THE SOCIETY OF INVESTIGATIVE DERMATOLOGY. A. CURTIS. (1954) *J. invest. Derm.*, **23**, 225.

The Society for I.D. was "the first and for many years the only organization in the world devoted exclusively to investigative work of all sorts relating to a single medical speciality."

It is interesting to learn that its birth was not painless. Many of the leaders of dermatology in the U.S.A. exerted their influence to prevent it—on all sorts of grounds: that one journal was enough, that it might lower the quality of all published work by dilution, that the financial deficit would be such that it would soon resort to accepting advertisements for remedies without intrinsic action that didn't work or only did so at first, or even because the sponsors represented foreign schools of thought.

The journal "does not confine itself to the objective of interesting the dermatologist, but stresses the publication of material that may be of equal or of even greater interest to non-dermatologists." It is however the duty and the pleasure of the dermatologist to be interested in these matters and as a subscriber he is entitled to have it made as easy as possible for him.

Your reviewer was recently told by a contributor of his acquaintance, to whom he had appealed for some hint of what he was supposed to have been doing, that the reader if sufficiently interested is expected to look up anything he doesn't understand in the books. Surely the first aim of a scientific writer must be to make his subject comprehensible to the ordinary educated reader. This may sometimes entail the improvement of his literary style, but more often only demands a brief explanation of the unfamiliar techniques and eponymous terms used.

J. H. T. D.

CUTANEOUS HYPERSENSITIVITY TO LANOLIN: INVESTIGATION OF ONE CASE. J. EVERALL and E. V. TREUTER. (1954) *J. invest. Derm.*, **22**, 493.

Lanolin is a highly complex mixture of organic substances: so many of them indeed that the task of their complete separation would probably constitute the task of a lifetime. Ordinarily it is regarded as consisting of cholesterol, lanosterol, a mixture of aliphatic alcohols and a residual dark gum comprising the minor constituents. The ordinary seeker after information may be glad to know that lanolin has a composition altogether different from that of sebum and that there is no element of heautotimoresis in being allergic to it.

In this case it was quickly shown that the aliphatic alcohols, separated from the rest by combining them with urea, did not include the allergen. So the residue was "chromatographed on activated alumina". One of the authors has kindly told me that this means that a solution of it (solvent not specified) was passed through a glass tube 24 in. long containing alumina and that 25 equal parts or "cuts" (each of about 200 c.c.) was drawn off as it issued from the end. Some of these cuts might each contain several (optically distinguishable) "fractions", but some of the more abundant substances might be found in several consecutive cuts. The source of the hypersensitivity was eventually traced to a smooth translucent non-crystalline solid rotating the plane of polarized light 25° to the right.

J. H. T. D.

ERYTHEMA EFFECTS OF A PURE BETA EMITTER (STRONTIUM 90) ON HUMAN SKIN. V. H. WITTEN, E. W. BRANER and V. HOLSTROM. (1954) *J. invest. Derm.*, **23**, 271.

The subject of this paper is not so much the therapeutic possibilities of such an apparatus, as the technical aspects of contact or near contact radiation of the skin. The radiations in question would appear to have a half value layer of 1 mm. of tissue, that is to say they would resemble Grenz rays.

There is considerable variation in individual susceptibility: double the dose producing an early erythema in one subject just failed to provoke any reaction at all in another. The same element was used in two applicators, one having a skin distance of 3.2 mm. the other of 9.5 mm. At the greater distance the dose, measured at the surface, required to give a reaction in 80% of cases was only 60% of that required at the smaller distance—presumably because the depth dose

was greater. The distance also influenced the date of onset of the "subsequent wave of erythema" which was observed at almost any time between the 30th and 60th day after radiation. This part of the reaction normally lasts 2-5 weeks, but in one case it persisted as long as 15 weeks.

We now have to get used to yet another radiotherapeutic conundrum—the "rad" (100 ergs absorbed per gramme of tissue); and we have narrowly escaped another—the "rep" (93 of the same) and one which might, for some of us, have had unhappy therapeutic associations.

J. H. T. D.

THE SKIN OF HAIRLESS MICE. II : AGEING CHANGES AND THE ACTION OF 20-METHYL-CHOLANTHRENE. W. MONTAGNA, H. B. CHASE and P. J. BROWN (1954). *J. invest. Derm.*, **23**, 259.

The term hairless is used in the same sense as wireless in telegraphy. The mice have no manifest coat of hair, but they have hair follicles and the sebaceous glands communicate with the surface. The hairs, however, mostly point the wrong way, so that as the mice grow older the frustrated trichological output is transformed into a heterodynamous condensation of cysts and foreign body granulomas. The application of methylcholanthrene brings about a succession of visible changes, some of which persist. Subsequently growths, mainly sebaceous adenoma, develop in the treated area—often in the biopsy scars. In two cases malignant growths (not of spontaneous occurrence in this mouse) developed later on parts of the skin that had not been treated.

J. H. T. D.

AN UNUSUAL LATE HISTOLOGIC CHANGE SEEN IN THE INTRACUTANEOUS TUBERCULIN REACTION. I. FISHER. (1954) *J. invest. Derm.*, **23**, 233.

"The tuberculin reaction is used to give much needed information clinically. It is also called upon to support many ideas and has been used to offer numerous interpretations."

Attention is here drawn to a histological picture resembling that of granuloma annulare, to be seen in nodules persisting 6 months or so after a positive Mantoux reaction. This account of it consists mainly of quotations from informal histopathological opinions.

J. H. T. D.

THE INFLUENCE OF THE LOCAL INJECTION OF HYDROCORTONE (COMPOUND F) IN THE REACTIONS TO TUBERCULIN LEPROMIN FREI AND DUCREY ANTIGENS. B. APPEL, J. M. M. FERNANDEZ, E. F. DOUGHERTY (1954). *J. invest. Derm.*, **23**, 237.

A succinct survey of the literature and a careful account of the experiment, illustrated with excellent microphotographs. 0.2 c.c. of saline suspending 5 mg. of hydrocortone acetate, injected simultaneously with the relevant antigens, produces a partial or total inhibition of reactions to lepromin—both of the early allergic (Fernandez) and of the late granulomatous (Mitsuda type)—and to Frei; but not quite so constantly with tuberculin and Ducrey.

J. H. T. D.

TECHNIC OF ASSAY OF AN UNKNOWN STEROID FOR POSSIBLE LOCAL ACTIVITY IN THE SKIN OF MAN. L. GOLDMAN, R. FLATT and J. BASKET. (1954) *J. invest. Derm.*, **23**, 251.

The authors inject their little bits of this, that, and the other steroid. They determine "that material is absorbed *rapidly, slowly, or not at all*" . . . "that a disappearance of psoriasis in the area injected is a strong presumptuous (sic) evidence of local activity in the skin of man" . . . "that with some soluble steroids the inhibition of inflammation may develop earlier and may be transient, but *it does occur* . ." and so it goes on.

J. H. T. D.

DEMONSTRATION OF BETA-GLUCURONIDASE IN HUMAN SKIN. S. M. MESTROW and R. B. STOUGHTON. (1954) *J. invest. Derm.*, **23**, 315.

Most of the β glucuronidase (which has something to do with hyaluronic acid, etc.) is to be found in the epidermis.

J. H. T. D.

A CASE OF MONILIAL GRANULOMAS ASSOCIATED WITH WIDESPREAD SUPERFICIAL MONILIASIS AND EPIDERMOPHYTOSIS. J. M. PLUSS and L. KADUS. (1954) *J. invest. Derm.*, **23**, 317.

The valuable and detailed account of a patient who had an anomalous host-parasite relationship with just the one particular strain each of *C. albicans* and *E. floccosum*.

J. H. T. D.

OCCURRENCE OF TRICHOPHYTON MENTAGROPHYTES AND MICROSPORON GYPSEUM ON HAIRS OF HEALTHY CATS. C. A. FUENTES, Z. E. BOSCH and C. C. BONDET. (1954) *J. invest. Derm.*, **23**, 311.

Of 29 "small cats" (anyhow not which the circus people call big cats) ordinarily inhabiting a small park among the ruins of the city walls of Havana, ostensibly healthy and destined for an inoculation experiment, 2 were discovered to be symptomless and Wood's glass negative carriers. J. H. T. D.

HISTOCHEMICAL DEMONSTRATION OF SUCCINIC ACID DEHYDROGENASE IN HUMAN SKIN. O. BRAUN-FALCO and B. RATHJENS. (1954) *Derm. Wschr.*, **130**, 1271.

According to present-day views the citric acid cycle constitutes the centre of biological oxidation processes. The presence of succinic acid dehydrogenase, which is necessary for the dehydration of succinic acid to fumaric acid, had been demonstrated in the epidermis of mice. The authors applied this investigation to the human skin and its appendages, using the techniques of Seligman and Rutenberg, and Goddard and Seligman. A deep blue line clearly demarcates the epidermis from the cutis. This can be seen macroscopically. Hair follicles, sweat and sebaceous glands show succinic acid dehydrogenase activity in the same way. The investigation clearly shows the presence of the enzyme in the human skin, particularly strongly in those parts of the skin and its appendages of which great functional activity is required. W. G. T.

THE AETIOLOGY OF GRANULOMATOSIS DISCIFORMIS CHRONICA ET PROGRESSIVA (MIESCHER). F. KEINING and O. BRAUN-FALCO (1955) *Derm. Wschr.*, **131**, 1.

A number of cases have been reported since the description of this condition by Miescher and Leder in 1948. The histological picture is fairly uniform, but differences in localization lead to a variation of morphological appearances. A number of cases from the literature are quoted and the authors add a case of their own. This case had lesions of the forehead and the left index finger. Old tuberculin reaction was negative up to 1/1000. The histological appearance of the finger lesion was typical of Boeck's sarcoid, and that of the lesion of the forehead was identical with the forehead lesion of the second case of Miescher and Leder. The radiological picture of the lung did not allow a definite exclusion of Boeck's sarcoid.

The simultaneous occurrence of typical Boeck's sarcoid and typical granulomatosis disciformis suggests to the authors that the latter condition is an atypical form of Boeck's sarcoid as had already been assumed by Tappeiner. W. G. T.

MOLLUSCUM SEBACEUM (KERATO-ACANTHOMA). J. J. ZOON, L. H. JANSSEN and J. VAN BAAK. (1954) *Dermatologica*, **108**, 81.

The authors state that this condition was unrecognized on the Continent before Rook and Whimster's presentation in Belgium in 1950, but it has since proved to be as common as in Britain. They agree in all essentials with the British accounts, and because, like Beare, they have had one case diagnosed as kerato-acanthoma which proved to be a true squamous-celled epithelioma, they emphasize the necessity for biopsy and subsequent very close observation. They believe in treating the lesion with contact x-ray, clean excision or with the sharp spoon. J. F. S.

THE NEUTRALIZATION OF ALKALI BY THE SKIN. D. J. H. VERMEER, J. C. DE JONG and J. B. LENSTRA. (1954) *Dermatologica*, **108**, 88.

This study confirms the results of Burekhardt that there are three types of alkali-neutralization by the skin: the normal (I), that found in eczema (II) and an intermediate (III), also found mainly in eczema. In type I amino-acids are a big factor, and in type III they are still present but less important. Their proportions, as shown by paper-chromatography, are much the same as in type I. Some diminution in the amounts of cations excreted by the skin in eczema was also noted, and this may take part in reducing the neutralizing power. Previous use of a fat solvent changed type I more or less to type II, suggesting that skin grease is an important factor in the former. The feebleness of neutralization found in children probably depends on the lower activity of the sebaceous glands before puberty. J. F. S.

DOUBLE MYCOTIC INFECTION IN SOME CASES OF TINEA OF THE SCALP. X. VILANOVA and M. CASANOVAS. (1954) *Dermatologica*, 108, 109.

Double infection with pathogenic fungi is rare, but in an inefficiently run orphanage in Barcelona infection with *T. violaceum* was endemic, and within a short period 5 children were found to be infected with *T. acuminatum* also. In several instances both pathogens were grown from a single fragment of hair. In culture in Sabouraud broth there was noted some reciprocal inhibition, but *in vivo*, and even on first culture, this was not evident. The rarity of double infection is therefore not to be attributed to mutual antagonism of fungi, but to the small chance of concomitant exposure to more than one species.

J. F. S.

ATRICHIA WITH PAPULAR LESIONS; A VARIANT OF CONGENITAL ECTODERMAL DYSPLASIA. T. J. DAMSTÉ and J. R. PRAKKEN. (1954) *Dermatologica*, 108, 114.

This paper records 3 cases of almost complete atrichia. They were born with more or less normal hair, but this fell out and was never replaced. A striking feature was an extensive papular eruption. Histological studies revealed different kinds of malformation of the follicles, and the papules were caused by follicular cysts. One case was familial, but in the others, no history of the condition in the family was obtained.

J. F. S.

ERYTHROMYCIN THERAPY OF ACNE VULGARIS. J. VAN DER ERVE. (1954) *J. invest. Derm.*, 23, 67.

The findings in a therapeutic experiment controlled by colour photography should have considerable value, especially where the criteria of response are based on the fading and recrudescence of individual lesions, but there is no reference to this mode of assessment in the tabulated results.

Patients were selected who had either "incomplete acne with comedones and excessive oiliness" or who had "a rather marked pyogenic phase" and in addition to being given the antibiotic they were also "placed on a diet low in heavy fats and greases."

"Complete control of pustules"—whatever that means—occurred in a number of cases, but while there is much talk of *Corynebacterium acnes* there is no evidence produced that it was caused to disappear from the pilosebaceous secretion.

J. H. T. D.

IN VITRO EFFECTS OF STILBAMIDINE AND 2-HYDROXYSTILBAMIDINE ON SOME PATHOGENIC FUNGI. C. L. TASCHDJIAN. (1954) *J. invest. Derm.*, 22, 521.

Success in the treatment of North American blastomycosis has been claimed for stilbamidine. For superficial dermatophytes growing on Sabouraud stilbamidine is fungistatic at concentrations varying between $\frac{1}{1,000}$ and $\frac{60}{1,000,000}$. In experiments simulating local application it was found not to penetrate hair or nails.

J. H. T. D.

SOME ENDOCRINE ASPECTS OF SKIN SENSITIZATION AND PRIMARY IRRITATION. (4) OBSERVATIONS ON THE INFLUENCE OF THYROID DEFICIENCY AND ADMINISTRATION OF THYROID HORMONE UPON CUTANEOUS IRRITATION AND SENSITIZATION REACTIONS. A. NILZEN and F. HUSSEY. (1954) *J. invest. Derm.*, 22, 503.

In an exhaustive and rigidly controlled series of experiments on guinea-pigs the authors demonstrate that thyroidectomy had no influence on the course of sensitization with paraphenylene diamine or on reactions to the primary irritant croton oil.

Large toxic doses of thyroid extract depress, possibly through interference with adrenal function, and similar doses of thyroxin enhance reactivity to paraphenylene diamine—equally in entire or thyroidectomized animals.

J. H. T. D.

CHELATION DEACTIVATION OF NICKEL ION IN ALLERGIC ECZEMATOUS SENSITIVITY. A. KURTIN and N. ORENTREICH. (1954) *J. invest. Derm.*, 22, 441.

To "chelate" nickel means to form a non-ionizable organic compound with it, and this is good enough to interfere with allergic reactions. An ointment, for example, containing disodium ethylene diamine tetra-acetic acid will protect the skin of the thigh against a suspender clip.

Among other suggested uses of chelation are the elucidation of patch test reactions to complex mixtures by excluding the heavy metal and denial to microbes of the trace metals essential to their growth. But it is more difficult to believe that a chelator would remove the calcium only

from morbid deposits or ignore calcium altogether in favour of some unwanted beryllium or silver, or even remove no more than the copper taking part in cutaneous melanogenesis.

J. H. T. D.

THE EFFECT OF MITOTIC POISONS ON HAIR GROWTH IN MICE. R. E. STRAUSS and A. M. KLLIGMAN. *J. invest. Derm.*, 22, 515.

The substantial material production of the hair follicle in anaphase is naturally associated with an intense mitotic activity. But when such inhibitors of mitosis as colchicine, triethylene melamine and the terrible 4,6-diamino-1-(p-chlorophenyl)-1, 2-dihydro-2, 2-dimethyl-s-triazine hydrochloride were painted on the backs of mice the hair was unaffected although ("... since colchicine in alcoholic solution was lethal absorption did occur...") enough seems to have been absorbed to kill the poor little things.

When injected intradermally, however, in smaller quantity and higher dilution, these drugs did seem to have some effect on the hair without killing the animal—except in the case of white ones.

These drugs do not inhibit sulphhydryl groups. The histological criterion of activity is, of course, mitotic arrest.

J. H. T. D.

CLINICAL AND EXPERIMENTAL ASPECTS OF XANTHOMATOSIS. M. K. POLANO and H. H. SNELLER. (1954) *J. invest. Derm.*, 22, 447.

Ingestion of excessive lipid by rabbits causes hypercholesterolaemia xanthoma and atheroma. As an index of dyslipidaemia the cholesterol/phospholipoid ratio does not appear to be more significant than total cholesterol values.

Treatment with iodine makes rabbits worse.

J. H. T. D.

ALLERGENIC PRINCIPLES OF POISON-IVY. VIII: IMMUNOLOGICAL PROPERTIES OF A HYDROURUSHIOL-ALBUMIN CONJUGATE. H. A. MASON and A. LADA. (1954) *J. invest. Derm.*, 22, 457.

The wide range of differences in sensitizability between individual guinea-pigs compels the use of large numbers. It is convincingly shown here that intraperitoneal injection of the conjugate can inhibit the development of sensitization for at least a month.

J. H. T. D.

HISTORADIOGRAPHIC STUDIES ON NORMAL HYPERPLASTIC AND CANCEROUS EPIDERMIS. G. MOBERGER and A. ENGSTROM. (1954) *J. invest. Derm.*, 22, 477.

Historadiography is a method of demonstrating the arrangement of the tissues not so much according to their chemical properties as to their dry weight. Minute very low voltage x-ray skiagrams are taken of paraffin sections, "stretched on their collodion membranes over a slit in a metal disc"—the paraffin having presumably been extracted with xylol—which are afterwards mounted and stained in the ordinary way.

The keratin constitutes the densest part of the epidermis and it is claimed that irregular cornification can be detected before it is tinctorially demonstrable. Moreover, the rate of change in the ratio of nuclear to cytoplasmic volume between basal layer and horny layer is supposed to have some significance in the differentiation of hypertrophy from cancer. A preparation complementary to historadiograph is the spodogram. This consists of darkground view of the same section which has been incinerated at 450° C. for 30 min.; it is supposed to show the distribution of non-volatile minerals.

At the moment it must be confessed that all this does not seem to get us very far, but it is interesting to know that it can be done.

J. H. T. D.

COMPARATIVE HISTOCHEMICAL OBSERVATIONS ON WOUND HEALING IN ADULT RATS AND CULTURED ADULT EPITHELIUM. W. W. WASHBURN. (1954)

I. METHODS AND GLYCOGEN DISTRIBUTION. *J. invest. Derm.*, 23, 97.

II. RIBONUCLEIC AND THYMONUCLEIC ACIDS. *J. invest. Derm.*, 23, 169.

These two papers are concerned with a single aspect of the carbohydrate and protein metabolism of the epidermis in circumstances of accelerated growth tissue cultures, carcinogenesis, wound healing; namely with the position within the cell of stainable deposits and with the position of cells containing them, both in the epithelial margins of wounds and in tissue explants. Histological sections of burns made in the "upper portion" of the abdomen of rats (presumably Kangaroo

rats and not the ordinary horizontal sort) and of cultures of human epithelium grown on coverslips prepared with collodion to facilitate their detachment for embedding in paraffin. For whole mount preparations the collodion film was dispensed with and the culture allowed to spread over the glass.

J. H. T. D.

A COMPARISON OF THE EFFECT OF ATROPINE AND PLACEBO ON THE GALVANIC SKIN RESISTANCE. D. J. PERRY and G. E. MOUNT. (1954) *J. invest. Derm.*, 22, 497.

The word *placebo* must surely be reserved for medicaments, having no specific effect on the relevant disease, smeared on, injected into or caused to be ingested through one or other of the natural orifices of a patient not being content to receive mere advice.

What is meant here is that atropine was injected on one occasion separated by 2-10 days from another on which only saline was given. The length of this interval makes it difficult to understand the reasons given for not varying the order. Nevertheless it does look as if atropine has some slight effect on the galvanic resistance of the skin.

J. H. T. D.

OBSERVATIONS ON THE REACTION OF CHRONIC INFLAMMATORY DERMATOSES AND OF NORMAL SKIN TO VARIED CONCENTRATES OF THORIUM X. O. S. HENDREN and H. PINKUS. (1954) *J. invest. Derm.*, 22, 463.

The differences between thorium X and radon are discussed; but the activity of preparations is expressed in microcuries per mil. instead of the electrostatic units familiar to the European reader.

There is a description, excellently illustrated with microphotographs, of the histological changes in normal epidermis brought about by treatment with thorium X.

The therapeutic results seem inconclusive; for fairly high dilutions were often found to be as effective as the concentrations recommended by the manufacturer. It is clear, of course, that in therapy of this kind the specific agent can rarely be held to account for the whole of the improvement obtained. If the reaction had any important influence on the metabolism of the skin surely one would expect it to aggravate at least as often as it helped.

J. H. T. D.

ANTIBIOTICS AND THEIR ACTION ON PATHOGENIC FUNGI. II: PENICILLIN AND STREPTOMYCIN; TERRAMYCIN. F. RAUBITSCHKE. (1954) *J. invest. Derm.*, 22, 359.

"The mode of action of the antibiotics has been assumed to be due to the enhancement of the conversion from the parasitic to the saprophytic life phase of pathogenic fungi." Whatever may be the meaning of this cryptic pronouncement it cannot justify the omission from this experiment of controls with unmedicated medium. For there is no real reason to be sure that this particular property, or even that of fattening pigs, will necessarily outlast the novelty of any antibiotic for a longer period than that of its clinical reputation.

J. H. T. D.

EFFECT OF STILBAMADINE THERAPY ON EXPERIMENTAL BLASTOMYCETES DERMATITIDI INFECTION IN MICE. M. K. WEST and W. F. VERWEY. (1954) *J. invest. Derm.*, 22, 363.

There is a satisfactory margin between the half lethal dose and that protecting 50% of the mice from an infection ordinarily 100% lethal.

J. H. T. D.

DIFFERENTIAL STAINING OF MITOCHONDRIA AND TONOFIBRILS IN HUMAN EPIDERMIS. H. PINKUS and C. H. STEEL. (1954) *J. invest. Derm.*, 22, 367.

A method employing acid fuchsin which requires "considerable experience".

J. H. T. D.

STUDIES ON SULPHYDRYL GROUPS IN SERA OF NORMAL HUMANS. R. W. GOLDBLUM, W. N. PIPER and C. J. OLSEN. (1954) *J. invest. Derm.*, 22, 373.

The chemical properties of serum are modified by heat, clot haemolysis, U.V.L. and x-rays. The differences in "SH concentration" were determined by "the amperometric method of Kolthoff and Harris", no clue to the nature of which is provided.

J. H. T. D.

THRESHOLD ERYTHEMA DOSE OF LOW VOLTAGE X-RAYS. A. N. DOMONKOS. (1954) *J. invest. Derm.*, 22, 369.

The main object in the development of low voltage Röntgen apparatus is that of obtaining greater intensity of superficial action while sparing the deeper layers of the skin and subcutaneous tissues from damage.

It must never be supposed, and it is not suggested here, that the production of erythema or any other reaction necessarily entails therapeutic benefit. It is perhaps enough that thoroughly up-to-date treatment can be administered and spectacular reactions obtained without permanent harm to the patient.

J. H. T. D.

THE RELATION OF PSORIASIS TO ATTITUDE AND TO VASCULAR REACTIONS OF THE HUMAN SKIN. D. T. GRAHAM. (1954) *J. invest. Derm.*, 22, 379.

This is an attempt to demonstrate the prevalence in psoriasis of a specific emotional "attitude" and possibly also of specific cutaneous vascular reactions.

The hue of the skin and its temperature depend on the arteriolar supply. When the arterioles relax the temperature rises and the tint brightens. The saturation or chroma, as opposed to the hue itself, depends more on the state of capillaries and venules; but since colour is not so easily determined or defined the tone of the capillaries is assayed on the threshold duration of compression required to evoke reactionary dilatation. In the average normal subject at ordinary room temperatures the threshold time is 25 seconds. In psoriasis the capillary tone is higher and can be made to rise by emotional stimuli. The attitude of the psoriatic was expressed by the patients here described in the following terms: I have a boring (gnawing, pawing, grinding, binding, whining) spouse (child, mother-in-law, employer, suitor) and I cannot do anything about it and indeed I just damn well have to put up with it.

J. H. T. D.

ARTIFICIAL LICHENIFICATION PRODUCED BY A SCRATCHING MACHINE. R. W. GOLDBLUM and W. N. PIPER. (1954) *J. invest. Derm.* 22, 405.

One white and 3 negro patients were submitted to the action of this scratching machine for anything up to a total of 90 hours to a single area. It would seem the results were analogous to those produced on the back of a horse by an ill-fitting saddle. But can this be called lichenification? At any rate the study fails to throw light on the lichenification that certain patients, and indeed susceptible individuals who may not at all consider themselves to be suffering from a skin disease, can produce overnight.

J. H. T. D.

APOCRINE SWEAT RETENTION IN MAN. I: EXPERIMENTAL ASYMPTOMATIC FORM. H. J. HURLEY and W. B. SHELLEY. (1954) *J. invest. Derm.*, 22, 397.

It is suggested that spontaneous apocrine sweat retention, with dilated ducts, etc., and presumably arising out of poral closure, is not infrequent and that evidence of it is often seen in biopsy material from the axilla. In these experiments poral closure was effected by extraction of the hair, after exhausting the gland by means of adrenalin and applying nitric acid to the follicular orifice or electrodesiccating it. After 3 days adrenalin was used to fill the gland and biopsy was performed in some subjects immediately, in others later. No clinical changes were noted. It appears that the duct dilates fairly easily and that secretion is inhibited by intraluminal pressure. There is no tendency to extravasation.

J. H. T. D.

PENICILLIN SENSITIVITY. W. HOWARD HUGHES. (1955) *Practitioner*, 49, 174.

Many reactions seen in the past were due not to penicillin itself but to existing mould sensitivity. Cross sensitivity with a ringworm infection is known. Contact dermatitis, perhaps with rhinitis and asthma, occurs in factory workers and nurses. Local sensitivity of the mouth from penicillin tablets may flare up at a later date from systemic penicillin. General reactions take the form of urticaria, angioneurotic oedema, eczema or asthma. Fatalities from oedema of the glottis are recorded. An acute attack should be controlled with adrenaline, if necessarily intravenously, and with antihistaminics. Cutaneous sensitivity may be determined by skin testing.

R. J. C.